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## 11. Census and Elevation Data Sources

### 11.1 HARP Map

The mapping features of HARP are integrated into the risk analysis. Maps are displayed automatically on the right side of the *Risk* window when setting up and running point estimate risk analysis. This section gives a brief summary of the mapping functions.

### 11.2 Street Map (Tiger) Data

A complete set of street maps for the state of California is delivered with HARP. To open a street map file from the *Risk* window, select ***Files/Open Map File*** from the menu.

The street map files that are delivered with HARP are derived from Tiger data, which is available from the Census Bureau. It can be purchased for the entire west coast of the United States on CD, or you can download data for a single county at a time for free from the Census Bureau web site at:

<http://www.census.gov/ftp/pub/geo/www/tiger/>

The data that is included with HARP is from the 1995 tiger files. Since this data was acquired, more recent data has become available, though it is not known whether the more recent (1999) is more accurate with respect to the street locations. If you are satisfied with 1995 data, then you can use the data that is delivered with HARP and ignore the rest of this section.

Tiger data is quite bulky. San Diego County alone is 94 megabytes. This is compressed on the Census Bureau web site, so the zipped download file is only about 12 megabytes. Obviously you will need a high-speed connection to complete the download in a reasonable length of time. (A one million bps DSL line does this in about 2 minutes.)

When you download a Tiger file for a particular county and unzip it, you end up with 17 separate files. Much of the information in these files relates to demographics and geographical features other than streets, which is not needed for the purposes of running HARP. HARP provides a function for extracting just the information that it needs from the raw Tiger files and reformatting it into a compact, fast binary file. The binary file has an extension of .MAP. It can be loaded and displayed with HARP relatively quickly compared to the ASCII Tiger format. The binary file for San Diego County occupies about 7 megabytes. (This is based on the 1995 data. The 1999 data produces a binary file of about 9 megabytes, so apparently some streets have been added.)

After you have downloaded and unzipped the Tiger file, the conversion to a binary map file is quite simple. From the *Risk* window, select ***Files/Conversions/Convert Tiger to Binary***. You will be prompted for the name of the Tiger file. It will have an extension of .F61 if it is 1995 data, and .RT1 if it is 1999 data. Note that there are several Tiger files (17 as indicated above), but the one you want to open will have one of these extensions.

You will be prompted for the name of the output file. It should have a .MAP extension for consistency with what HARP expects. The name of the file should reflect the county that it represents to make it easier to identify in the future.

The conversion will take several minutes. After the conversion is done you will have a .MAP file that can be opened directly by HARP.

To aid you in locating the correct Tiger data file for downloading, the following is a list of the FIPS Codes (Federal Information Processing Systems) and CENID code (Census ID codes) for all of the counties in California. The name of the file that you should download is constructed by concatenating the letters TGR with the five-digit FIPS code. For example, the FIPS code for San Diego as shown below is 06073, so the name of the file that you want to download for San Diego is TGR06073.ZIP.

List of FIPS codes for counties in California:

06 001	1370	Alameda	CA
06 003	1372	Alpine	CA
06 005	1374	Amador	CA
06 007	1376	Butte	CA
06 009	1378	Calaveras	CA
06 011	1380	Colusa	CA
06 013	1382	Contra Costa	CA
06 015	1384	Del Norte	CA
06 017	1386	El Dorado	CA
06 019	1388	Fresno	CA
06 021	1390	Glenn	CA
06 023	1392	Humboldt	CA
06 025	1394	Imperial	CA
06 027	1396	Inyo	CA
06 029	1398	Kern	CA
06 031	1400	Kings	CA
06 033	1402	Lake	CA
06 035	1404	Lassen	CA
06 037	1406	Los Angeles	CA
06 039	1408	Madera	CA
06 041	1410	Marin	CA
06 043	1412	Mariposa	CA
06 045	1414	Mendocino	CA
06 047	1416	Merced	CA
06 049	1418	Modoc	CA
06 051	1420	Mono	CA
06 053	1422	Monterey	CA
06 055	1424	Napa	CA
06 057	1426	Nevada	CA
06 059	1428	Orange	CA
06 061	1430	Placer	CA
06 063	1432	Plumas	CA
06 065	1434	Riverside	CA
06 067	1436	Sacramento	CA
06 069	1438	San Benito	CA

06 071 1440 San Bernardino CA  
06 073 1442 San Diego CA  
06 075 1444 San Francisco CA  
06 077 1446 San Joaquin CA  
06 079 1448 San Luis Obispo CA  
06 081 1450 San Mateo CA  
06 083 1452 Santa Barbara CA  
06 085 1454 Santa Clara CA  
06 087 1456 Santa Cruz CA  
06 089 1458 Shasta CA  
06 091 1460 Sierra CA  
06 093 1462 Siskiyou CA  
06 095 1464 Solano CA  
06 097 1466 Sonoma CA  
06 099 1468 Stanislaus CA  
06 101 1470 Sutter CA  
06 103 1472 Tehama CA  
06 105 1474 Trinity CA  
06 107 1476 Tulare CA  
06 109 1478 Tuolumne CA  
06 111 1480 Ventura CA  
06 113 1482 Yolo CA  
06 115 1484 Yuba CA

HARP can read any Tiger map file. For speed and storage efficiency, the Tiger files must first be converted to a HARP binary map file format. If you have acquired a Tiger file from some other source, you can convert it to binary by going to the risk window and select ***Files/Conversions/Convert Tiger to Binary*** from the menu. You will be prompted for the name of the Tiger file. HARP will then create a .map file. There is a limitation in that the conversion utility that is built into HARP only creates map files in UTM NAD83.

### **11.3 Elevation (DEM) Data (File extension \*.dem)**

#### **11.3.1 Introduction to Digital Elevation Model (DEM) Data**

Digital elevation model (DEM) files contain elevation data that can be used by HARP to automatically calculate elevations for stacks and receptors. Elevation data can be obtained in the format of DEM (Digital Elevation Model) files from the United States Geological Survey (USGS). This data can be utilized by HARP to simplify the determination of elevations of sources and receptors so that you do not have to enter elevations manually.

HARP has the ability to use DEM files in both the dispersion analysis and the risk analysis modules. You should be sure that the DEM data that you acquire covers the area of interest. If HARP attempts to look up the elevation for a source or receptor that is outside of the range of the DEM data, HARP will fill in a value of zero.

It is quite possible that a single DEM file does not cover the area that you are analyzing. You can open more than one DEM file concurrently by repeatedly selecting ***Files/DEM/Open DEM file*** from the menu. This allows you to cover a wider geographic area than would be provided by only a single DEM file. To see what files are currently open, select ***Files/DEM/List Open DEM Files*** from the menu.

If you have loaded multiple DEM files into memory concurrently, HARP will remember the names of all of the files the next time you run HARP. Instead of loading each file individually, you can select **Files/DEM/Load Most Recent DEM Files** from the menu. HARP will then load all of the files in sequence.

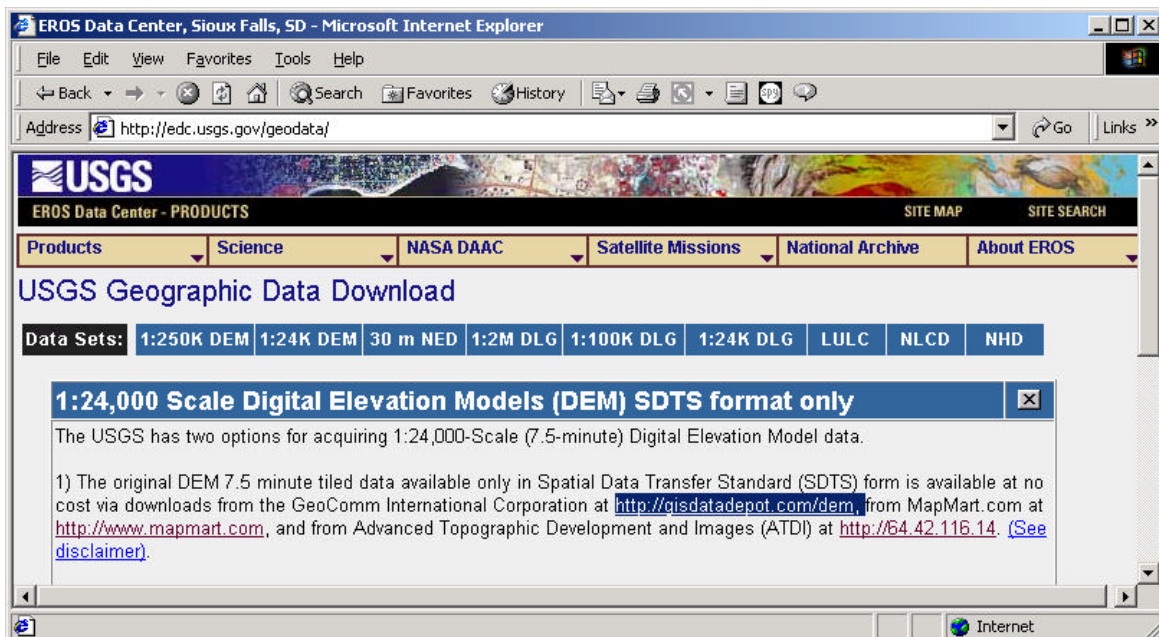
### 11.3.2 Download the Data from the USGS Website and Converting It

This section explains how to acquire DEM data from the United States Geological Survey (USGS) and convert it to the correct format for use by HARP. DEM data is available over the Internet from the USGS. Unfortunately, the USGS files are in SDTS format and there are several steps required to download the data and convert it into a form that can be used by HARP. To make this process a bit easier, when you install HARP, all of the tools that you need to accomplish this awkward task are included with the installation, with one exception (you will need a copy of WinZip as described below).

In the example below, it is assumed that you want to download elevation data for the La Jolla area of San Diego County.

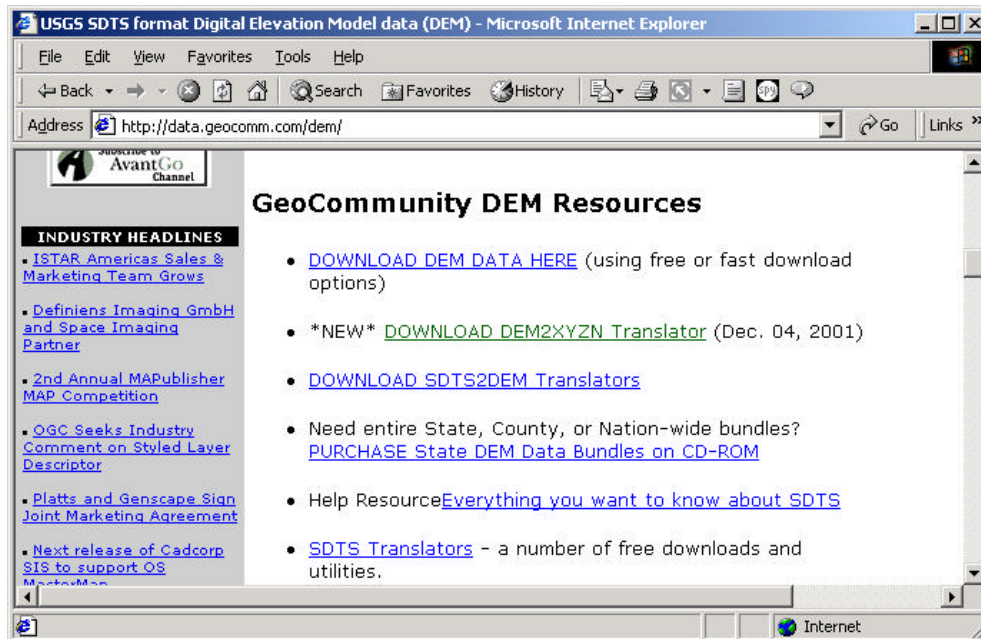
Use your Internet browser to access the USGS website at URL: <http://edc.usgs.gov/geodata/>

- Click on the Data Set option labeled “1:24K DEM”
- The top of the web page will direct you to at least three alternative sites where you can download DEM data. In this example, we assume that you have selected the link to <http://gisdatadepot.com/dem>.
- Click on the link to <http://gisdatadepot.com/dem>

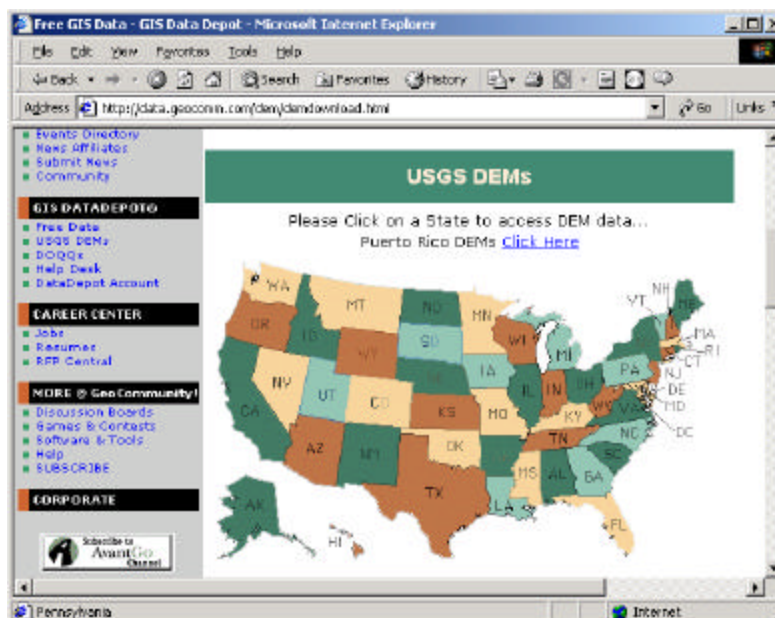


- You should now be at the following URL: <http://data.geocomm.com/dem/>

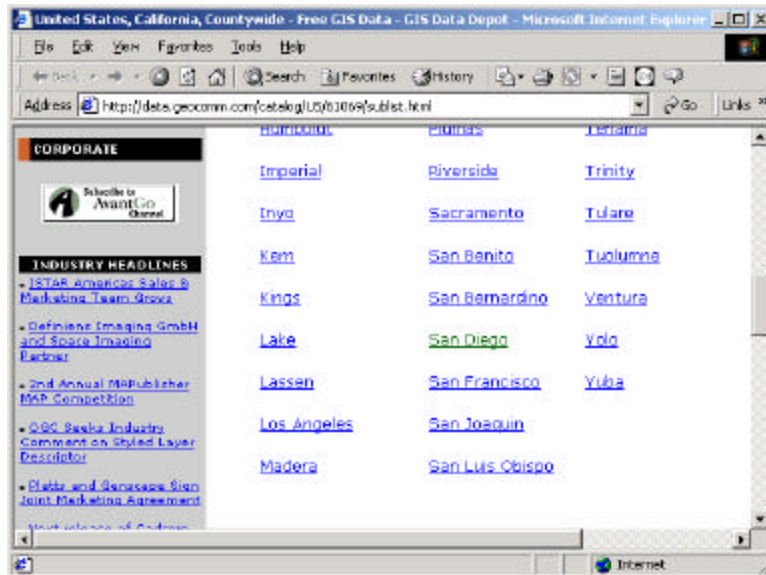
- Scroll down the page until you find the section shown below.
- Click on the link that says “DOWNLOAD DEM DATA HERE”



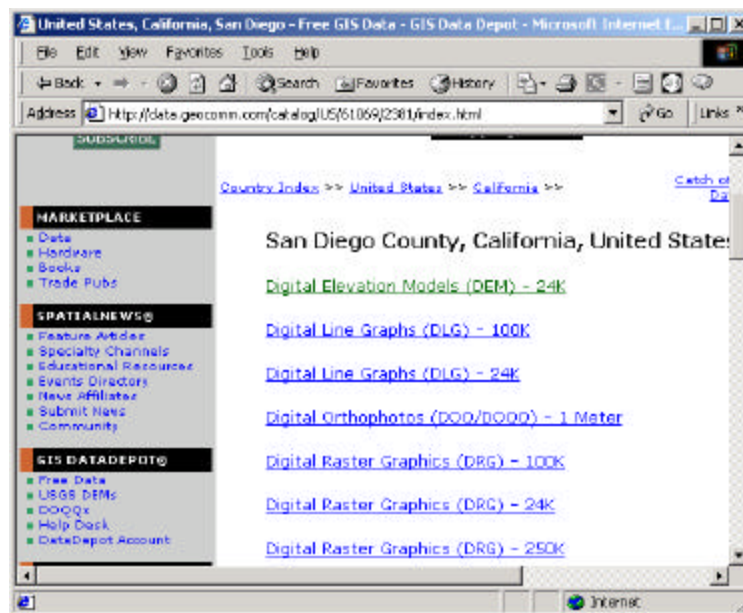
- You should now be at <http://data.geocomm.com/dem/demdownload.html>
- Scroll down the page till you see the U.S. Map
- Click on California



- Scroll down the page and click on the county, in this example it is San Diego

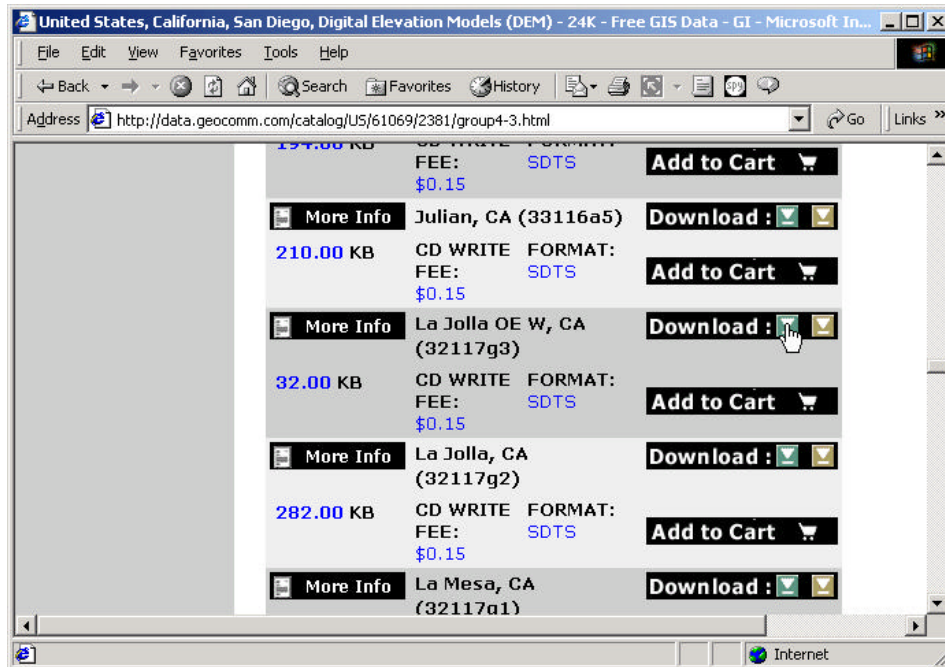


- Click on the link that says “Digital Elevation Models (DEM) – 24K”

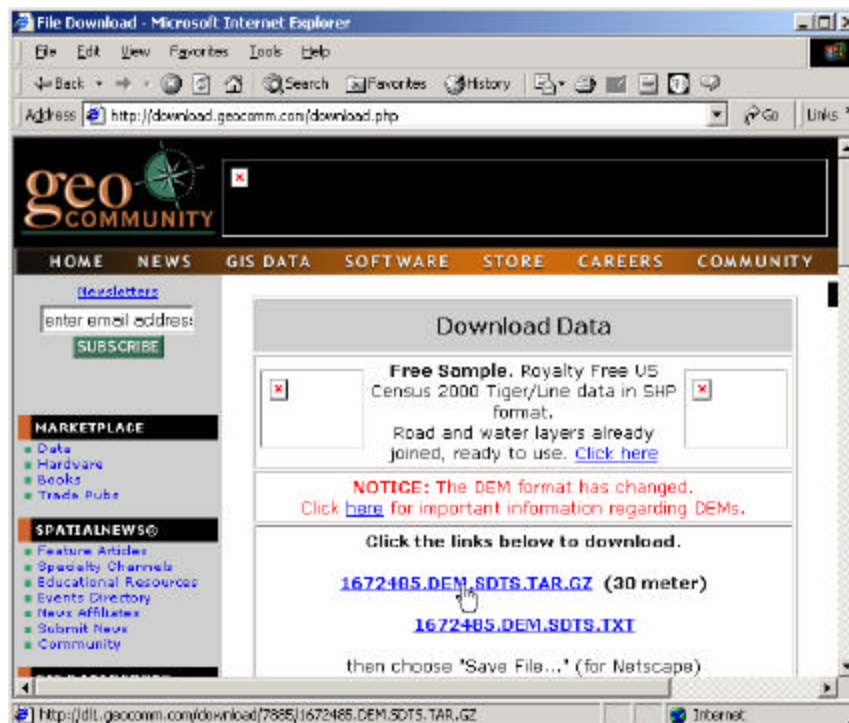


- You should see a long list of available DEM data files sorted by the name of the community (Note: in the previous version of the USGS web site you were able to select the local area by clicking on a map. Unfortunately you will now have to make an educated guess at the map name.)
- You may be asked to enter a user name and password. If you do not have one, you may create a new user account at no cost. Follow the on-screen instructions.
- Click on the green download button to the right of the map name as shown below. In this example, select La Jolla OE W, which is the western part of La Jolla.



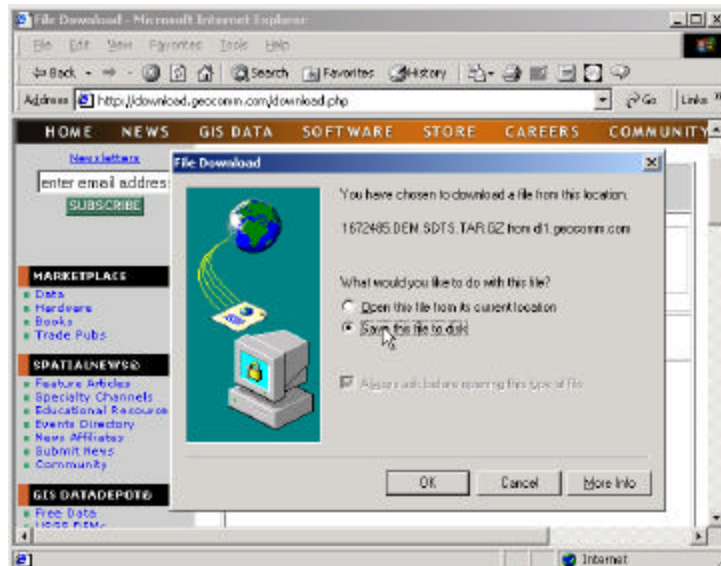


- You should see a screen similar to below. Click on the link to the zipped tar file having the GZ extension.

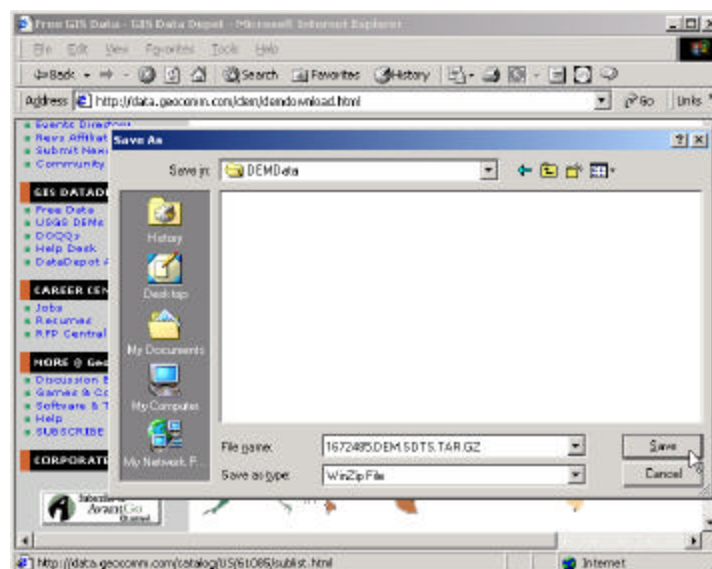


- You should see a File Download window. Select "Save this file to disk", then press OK.

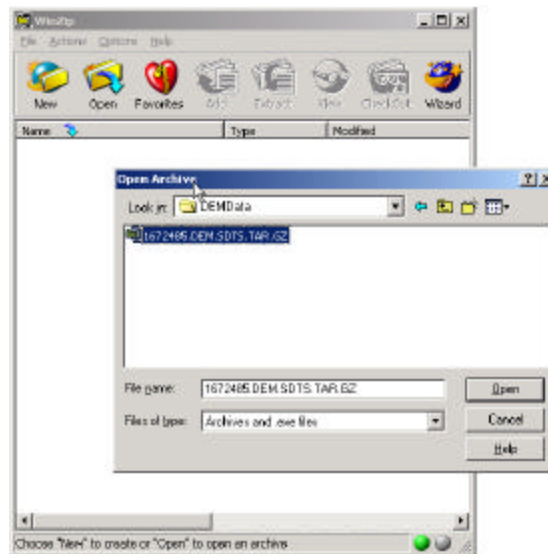




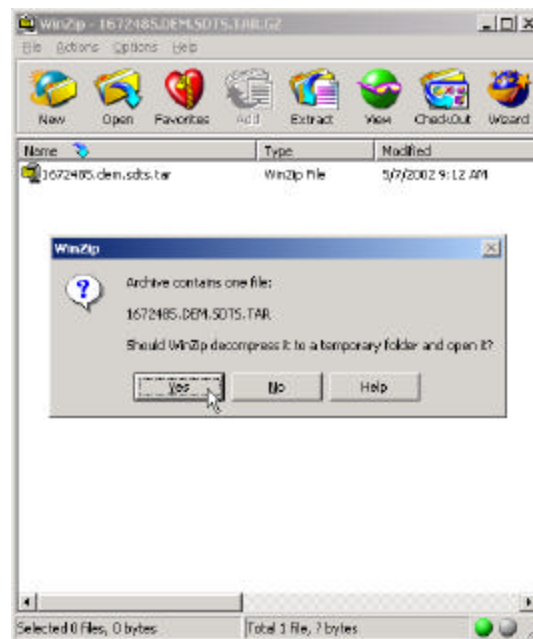
- Select the directory where you want to save the file on your local disk, then press Save.



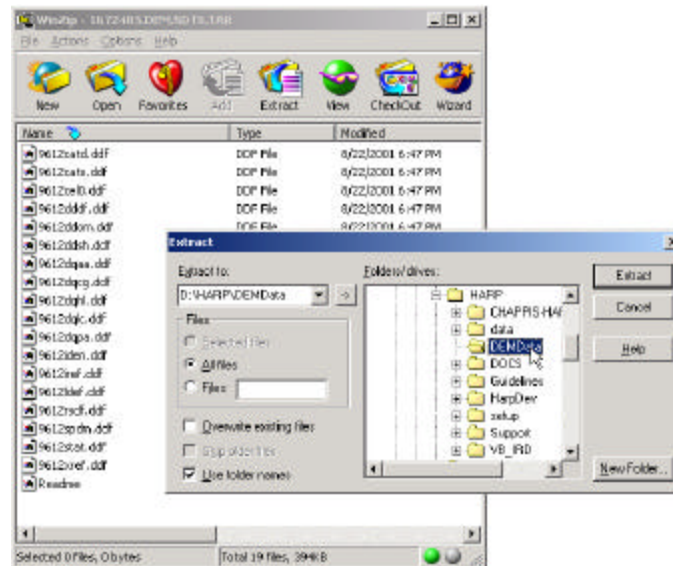
- The downloaded file in GZ (zipped) format.
- The GZ file must be unzipped; this will produce a Unix tar file. This can be done using Winzip.
- The tar file must be extracted to produce a set of files in SDTS format (Spatial Data Transfer System).
- The SDTS files must be converted to DEM (Digital Elevation Model) files.
- To acquire WinZip go to [www.winzip.com](http://www.winzip.com). (At the time of this writing the cost is \$29)
- Open the GZ file that you saved using WinZip.



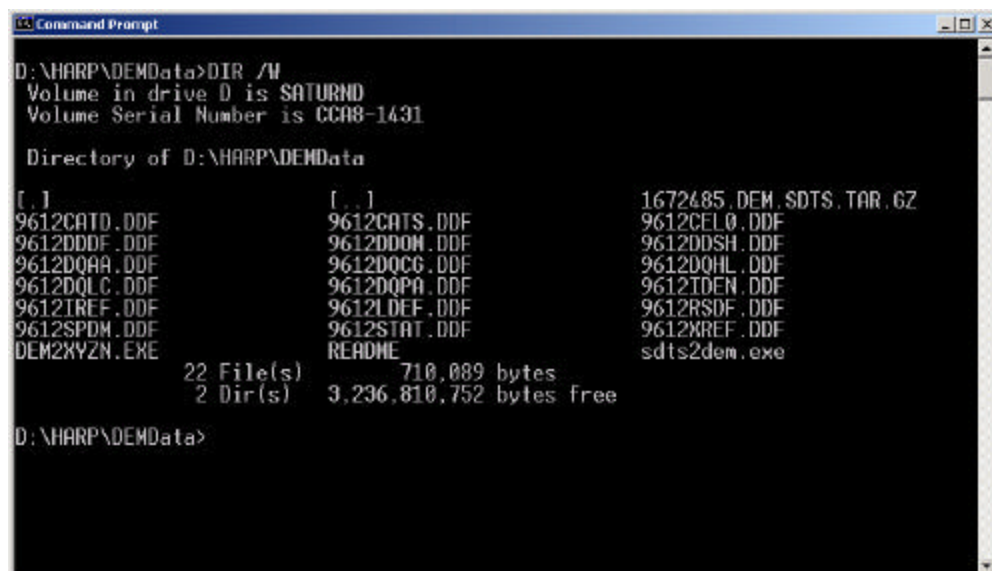
- WinZip identifies the tar file contained in the GZ file.
- When prompted click Yes to uncompress the GZ file to a tar file and then un-tar the tar file.



- Click the Extract button on the WinZip window.
- Select the directory where you want to place the extracted files.
- After the extraction, the directory will contain a set of .ddf files. These files contain the DEM data in the SDTS format (Spatial Data Transfer System).



- You will need to copy one of the utility programs from the HARP directory to the directory where you have stored the DEM data (in the form of .ddf files)
- Copy SDTS2DEM.EXE to your data directory.
- Open a command window. First click the Windows Start button. Select Programs, then Accessories, then Command Prompt
- At the command prompt use the CD command to change to directory where the data is saved
- In this example, first type D: to change to the D: disk drive
- Then type CD \HARP\DEMDATA to change to the data directory where I have chosen to put the downloaded data
- A directory list of your data directory should look like this:



- Type SDTS2DEM
- When prompted type the first four characters of the .ddf file name, in this case 9612
- When prompted, enter the file name of the output file, without any extension. In this example, I have chosen to name the output file LAJOLLAW

```

Command Prompt - SDTS2DEM
D:\HARP\DEMDData>SDTS2DEM

SDTS2DEM v.0.018 (29 April 2002) by Sol Katz / AHC / WSE / GMT

Usage: sdts2dem [-n] [DDFbase] [DEMBase] [cell_id]
       -n: put newlines at end of 1024-char line [default is NO newline].
       DDFbase: first 4 chars (ABCD) in DDF file name (ABCDxxxx.ddf)
       DEMbase: file name for output without .DEM extension
       cell_id: characters in position 7 and 8 of CELL file name (usually 'L0')

Enter first 4 charcters of the base SDTS file name: 9612
Enter base output file name (exclude any extension): LAJOLLAW

```

- The screen output should look like this:

```

Command Prompt

Summary of SDTS/DEM Data Files
Title - LA JOLLA OE W, CA-24000  LAT::  32 45  0.0000 N LONG:: -117 15  0.0000
W SCALE:: 24000
Date = 2001823
Range: max= 250.0, min= 0.0, void= -32767, fill= -32766
Cell Width:      30.000000 meters
Cell Height:     30.000000 meters
Vertical Resolution: 1.000000 meters
Projection:      UTM
Zone:            11
Total rows = 463, Total columns= 392

Reading input SDTS file .....
Writing output DEM file .....

Final Output USGS DEM:
Min:      0
Max:      250
Rows:     463
Cols:     392

Quad Boundary
SW  464869.73  3623444.39
NW  464918.88  3637301.18
NE  476612.62  3637266.56
SE  476579.86  3623409.84

D:\HARP\DEMDData>

```

- Verify that the directory now contains a file called LAJOLLAW.DEM

```
Command Prompt
NE 476612.62 3637266.56
SE 476579.86 3623409.84

D:\HARP\DEMDData>dir *.dem
Volume in drive D is SATURND
Volume Serial Number is CCA8-1431

Directory of D:\HARP\DEMDData

05/07/2002 09:36a      1,202,176 LAJOLLAW.dem
             1 File(s)      1,202,176 bytes
             0 Dir(s)  3,235,606,528 bytes free

D:\HARP\DEMDData>
```